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Abstract

We evaluate the impact of a mandatory financial education program on female customers of an urban micro-finance institution (MFI) headquartered in Mumbai, India. We exploit the variation in timing of the financial literacy program across the branches to identify if there was an improvement in the loan repayment performance.

Our results suggest that financial literacy led to a decline in the total number of days taken to make loan repayments as well as the number of months in which the repayment was late. More importantly, financial education helped those in homogeneous groups of reserved castes overcome their initial disadvantage of low financial literacy relative to those in mixed caste groups.

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1 Introduction

The financial crisis of 2008 spurred an active policy debate on the optimal way to pursue consumer financial protection (Campbell et. al., 2011). Mandating disclosures by financial firms and improving financial literacy are important components of this reform. For example, one of the objectives of the recently established Consumer Financial Protection Bureau (CFPB) in the US is to develop a strategy to improve financial literacy of consumers through the Office of Financial Education. Emerging economies such as India have also had to grapple with episodes of mis-selling in finance[1] set against a backdrop of large scale financial exclusion. In this context, promoting financial inclusion by empowering consumers to make better financial decisions through financial literacy training and disclosures has become an important goal of policy (Committee on Investor Awareness and Protection, 2010).

The emphasis on financial literacy stems from evidence on the pervasiveness of financial mistakes made by consumers, some of which have detrimental consequences.[2] These can prove to be devastating for low income and disadvantaged consumers. For example, Rugh and Massey (2010) find that black residential dissimilarity and spatial isolation were powerful predictors of foreclosures across U.S. cities. In the context of developing countries such as India, consumers of micro-finance, have high volatility in incomes, often come from disadvantaged backgrounds, do not have adequate resources to deal with emergencies, and are denied credit by the mainstream banking sector. Thus, they are less likely to be financially savvy, more likely to overlook the costs of borrowing and often end up in financial distress.

While financial literacy holds much promise in theory, evidence on the effectiveness of such training remains inconclusive.[3] The aim of this study is twofold. First, we study the influence of a mandatory financial literacy program for urban female micro-finance customers in India. The micro-finance institution (MFI), called Swadhaar, focuses on segments of the urban poor that fall between the traditionally bankable and the ultra-poor populations targeted by government and non-profit initiatives. Using administrative data and a differences-in-differences (DID) strategy, we exploit the variation in implementation of financial education across time and branch locations to study the impact on default and repayment.

The results in the paper suggest that financial literacy led to a decline in the total number

[1] For examples of mis-selling please refer to Anagol and Kim (2012), Anagol, Cole, and Sarkar (2012), and Halan, Sane, and Thomas (2013)

[2] Campbell (2006) provides various examples of financial mistakes made by consumers.

[3] Hastings, Madrian, and Skimmyhorn (2012) provide a review of financial literacy programs.

of days taken to repay MFI debt as well as the number of months in which repayment was delayed over a six month period. These responses may be directly driven by the content of the mandatory financial literacy program, or indirectly by encouraging individuals to seek further information before making financial choices.[4] They point out that financial literacy, even when conveyed over a relatively short time period, can influence repayment behavior.

A second aim of this paper is to study the relation between group homogeneity, financial literacy and financial outcomes of borrowers. A group's homogeneity with respect to social class, neighborhood, ethnic group, or religion might be positively correlated with the group's performance. However, if all members of a group have particularly low levels of financial literacy, even if they are similar in social class or ethnic group, we may witness adverse effect on the groups' financial performance.

The Indian caste system provides us with an excellent platform for studying the effect of social ties and group homogeneity on financial behavior of borrowers. According to Census 2001, approximately 23 percent of the population in India is designated as Scheduled Castes (SC) and Schedule Tribes (ST). Moreover, this segment of the population has low levels of general literacy at about 42 percent for SC and 34 percent for ST. Low literacy levels lead to limited financial awareness and thus, will often cause adverse financial outcomes (Xu and Zia, 2012). This may further push these disadvantaged groups into a perpetual cycle of indebtedness and poor financial choices, making it harder for them to break discriminatory social barriers.

Our results on the number of months repayment is delayed show that if all MFI group members belong to the same backward caste, there is a detrimental effect on repayment time compared to belonging to a heterogeneous caste group. However, that effect goes away after taking the financial education classes. This is consistent with Bonte and Filipiak (2012) who find that backward classes in India have a lower probability of being aware of financial instruments and that the lack of financial literacy among these groups is an important obstacle for participation in financial markets.

In the context of developing countries, access to finance is only partly a function of widespread availability of financial products and services. Meaningful and sustained access of such services will take place when people are able to process information about financial products and act on the same. Micro-finance institutions, for example, hold enormous potential for providing capital for entrepreneurship and consumption smoothing to a population under-served by formal finance (Khandker and Samad, 2014). In recent times,

[4]We are unable to identify if individuals have taken any other voluntary financial education classes after the mandatory program.

these institutions have been criticized for alleged predatory lending practices leading to over-indebtedness among borrowers. This led to political backlash and downsizing of the industry in India which can be extremely expensive for a country with low levels of access to formal finance.[5]

If financial literacy works, then empowering consumers to access the services of such institutions through better training can go a long way in achieving the goals of financial inclusion. Our research contributes to the literature on financial literacy by showing that even short, uncomplicated mandatory programs are able to improve repayment behavior among poor urban households, including those belonging to the backward castes.

The remainder of the paper is structured as follows. Section 2 discusses the literature relevant for our analysis. Section 3 gives the background of the study including the description of the MFI, the financial education classes and the data used. Section 4 presents the empirical strategy. We show the main results in Section 5. In Section 6 we discuss the main threats to validity of our results. This includes an analysis of the results dropping one branch at a time in section 6.1, and an analysis using a matching estimator in section 6.2. Section 7 concludes.

2 Literature

Research suggests that financial illiteracy is an important contributory cause of low savings levels and poor financial management. Financially illiterate households tend not to plan for future or unexpected events, borrow at high interest rates, acquire few assets, conduct non-optimal mortgage equity withdrawals (van Rooij, Lusardi, and Alessie, 2012; Lusardi and Mitchell, 2013; Duca and Kumar, 2014). Recent evidence from Russia shows that financial literacy is positively related to the use of formal banking and borrowing and negatively related to the use of informal borrowing. Moreover individuals with greater financial literacy were less likely to report experiencing a negative income shock during the 2009 financial crisis (Klapper, Lusardi, and Panos, 2013). Several recent papers have evaluated the effect of financial literacy training on individual outcomes such as savings, remittances, entrepreneurial activities and asset accumulation (Cole and Shastry, 2009; Hastings, Madrian, and Skimmyhorn, 2012). The focus on low-income households who may benefit the most is, however, limited (Collins, 2013).

In the backdrop of this evidence, this paper contributes to two strands of literature. First, in a developing country context, it is important to study the effect of financial literacy

[5]Chakrabarti and Ravi (2011) provide an overview of the micro-finance industry in India.

on debt and repayment performance if concerns about financial inclusion and consumer protection are to be addressed. High repayment rates can reduce cost of credit and thus allow MFIs to lower the interest rate they charge, enabling more borrowers to have access to finance. The literature on the effects of financial literacy on debt related measures such as default rates and repayment probability is muted and mostly focused on developed countries.

Lusardi and Tufano (2009) focus specifically on debt literacy, i.e. the capacity of individuals to make simple financial calculations on matters directly pertaining to the cost of debt contracts. They find very low levels of literacy across the US population. Less debt literate individuals are found to bear a disproportionately large share of avoidable costs (e.g., late fees), or borrow too much at high rates without realizing future consequences (Agarwal et. al., 2007). Numerical ability is found to be negatively correlated with various measures of delinquency and default suggesting that financial illiteracy played an important role in the sub-prime mortgage crisis (Gerardi, Goette, and Meier, 2010).

Agarwal et. al. (2010) show that participants in a voluntary financial education program are less likely to fall behind on their mortgage payments indicating that increased financial literacy leads to lower delinquency rates. In Burkina Faso, micro-finance groups that received loan literacy training had higher repayment performance, confirming the positive effect of financial literacy (Paxton, Graham, and Thraen, 2000). We contribute to this literature by studying the influence of a mandatory financial literacy program on repayment performance for urban female micro-finance customers in India.

We also contribute to the literature that studies a key question of interest in micro-finance lending; does group homogeneity affect repayment behavior of borrowers? A group's homogeneity with respect to social class, neighborhood, ethnic group, or religion is considered to be positively correlated with the group's performance. Karlan (2007) points out that social connections in group lending work for a few reasons: individuals are able to select creditworthy peers, are able to monitor each others use of funds, are able to enforce repayment, and are more likely to repay merely because of altruism towards those in their group.

However, empirical studies have found a mixed effect of social connections on group performance. Using Peruvian data, Karlan (2007) finds that individuals with stronger social connections to their fellow group members have higher repayment rates. On the other hand, Sharma and Zeller (1997) and Ahlin and Townsend (2007) using data from Bangladesh and Thailand, respectively, find that groups with high levels of family relations have higher default.

The Indian caste system provides us with an excellent platform for studying the effect of social ties and group homogeneity on behavior of borrowers. The Scheduled Castes, Scheduled Tribes are two groups of historically-disadvantaged people recognized in the Constitution of India. In addition, Other Backward Castes (OBC) are also recognized by certain states. It is a common practice for individuals belonging to the same caste to remain close in their social relations, marriages, and rituals. For instance, Banerjee et. al. (2009) show that in India, even today, there is a strong preference for within-caste marriages. At the same time, individuals belonging to disadvantaged groups are more likely to have low levels of financial literacy. Bonte and Filipiak (2012) find that backward classes in India have a lower probability of being aware of financial instruments even after controlling for a number of potential confounds. Moreover, they find that the lack of financial literacy among backward classes is an important obstacle for participation in financial markets. Thus, not only is it important to study the effect of caste but also the interactive effect of financial literacy and caste on repayment performance.

3 The setting

3.1 The financial firm: Swadhaar

Swadhaar FinServe Pvt. Ltd. (Swadhaar) is a Non-Banking Finance Company[6] (NBFC) that provides micro-finance. The company was launched in 2008, and is headquartered in Mumbai, India. The company's aim is to provide financial services to India's economically active urban poor.

Swadhaar focuses on segments of the urban poor that fall between the traditionally bankable and the ultra-poor populations targeted by government and non-profit initiatives. This is because many slum-dwellers do not qualify for either segment, and therefore, they remain excluded from both full financial access and social aid programs.

Our data comprises of beneficiaries of the Joint-Liability-Group (JLG) product of Swadhaar, which is aimed at economically active women whose income falls under or just above the international poverty line ($2 a day). The women usually are secondary earners in their households and while some do not have a steady income of their own, they

[6]A Non-Banking Financial Company (NBFC) in India is a company registered under the Companies Act, 1956 engaged in the business of loans and advances, acquisition of shares/stocks/bonds/debentures/securities issued by Government or local authority or other marketable securities of a like nature, leasing, hire-purchase, insurance business, chit business. NBFCs cannot accept demand deposits. For more details see `http://www.rbi.org.in/scripts/FAQView.aspx?Id=71`.

contribute to a home-based or family enterprise. This population is unable to access formal credit, as most families lack the requisite documentation and collateral guarantee requirements.

Swadhaar uses a capacity-based lending methodology to determine whether to and what amount to lend to a prospective client. Capacity-based lending consists of a two-part evaluation that examines both the client's willingness to repay and her financial capacity to service a loan. The underwriting decision is ultimately determined by both the analysis of a client's willingness to repay and an assessment of her household and business cash flows.

The typical interest rate on JLG loans is 26 percent per annum on a declining principal balance. The monthly interest rate is about 1.22 percent, with an APR of 27.97 percent. Loan amounts range from INR 15,000 to INR 35,000 for a period of 12 or 24 months.

3.2 The financial education initiative

Swadhaar FinAccess (SFA), a non-profit company founded by the promoters of Swadhaar FinServe, conducts a financial education program to enhance participants' financial management skills. The Client Education Program (CEP) is a *mandatory* one and a half hour programme designed for the micro-credit loan clients. Among other things, the CEP focuses on prudent borrowing, repayment and credit history, rights of the client as a borrower and methods of regular saving. The session is conducted in the branch itself prior to the disbursal of the loan which allows for checks on group cohesiveness. The training methodology involves use of a variety of visual aids, stories, role playing and games, making it simple, interactive and interesting.

Trainers are graduates or undergraduates and mostly women. They have experience of working with the low income communities. The trainings are conducted in local language (Hindi, Marathi or Gujarati) and all the trainers have been trained in-house to conduct different financial education programmes including the mandatory program. Moreover, all the trainers are given regular refresher trainings. The training module consists of the following features:

- Introduction to Swadhaar
- Familiarity cross check within the group members
- Responsible Borrowing
- Discussion on disadvantages of multiple lending

- Broad overview of the loan product
- Introduction to Credit bureau
- Importance of regular small savings
- Teach methods of successful and easy repayment of loan through regular savings
- Activity on power of compounding
- Introduction to Customer Grievances Redress Process (rights as borrowers)

The key objective of this initiative is that clients improve their ability to manage credit and become financially informed about savings and rights as customers. The program also educates the client to move beyond credit and manage their finances well for better financial planning for future.[7]

3.3 Data

Our data comes from administrative records of Swadhaar from 5 branches across Mumbai in the state of Maharashtra and three cities in the state of Gujarat.[8] The details of the branches and the date of initiation of the program are provided in Table 1.

Table 1 Training details: Branches and dates

Branch name	City/State	Date
Gotri	Gujarat	12 July 2012
Anand	Gujarat	18 July 2012
Thane	Mumbai	27 Aug 2012
Bharuch	Gujarat	No Training
Wadala	Mumbai	No Training

We have records on loan disbursements and repayments from 2012 and 2013. Across all five branches, we have data on loans that were disbursed prior and after the financial literacy program in each branch was implemented. As shown in Tabe 1, the Wadala branch in Mumbai and Bharuch branch in Gujarat never introduced the financial literacy classes. The last month of repayment in our data is February 2014.

[7]The company runs another voluntary education initiative. Clients can choose to pay to attend this program which consists of 5 modules of 6 hours each, and is thus more detailed and of longer duration after having attended the mandatory program. We do not have details about participation in this program at present.

[8]Swadhaar claims to have chosen these branches based on geographical convenience and not strategic compulsions.

Table 2 provides branch wise summary statistics on various characteristics of the individuals at each of the branches.

Table 2 Summary statistics

Branch	N	Financial Training	Age	Married	Caste: SC/ST/OBC	Income	No. children	No. dependents	Illiterate
Anand	4516	0.96	37.39	0.92	0.17	7997.25	1.37	2.65	0.49
		(0.20)	(8.40)	(0.27)	(0.38)	(1440.12)	(1.22)	(1.40)	(0.50)
Bharuch	4008	0.00	36.94	0.83	0.38	7222.08	1.21	2.20	0.33
		(0.00)	(8.80)	(0.37)	(0.49)	(1536.94)	(1.20)	(1.23)	(0.47)
Gotri	4035	0.94	37.53	0.90	0.73	9270.94	1.25	2.29	0.37
		(0.25)	(8.24)	(0.30)	(0.44)	(901.25)	(1.14)	(1.19)	(0.48)
Thane	3190	0.88	38.41	0.84	0.33	9206.66	1.15	2.27	0.34
		(0.33)	(8.28)	(0.37)	(0.47)	(920.53)	(1.11)	(1.27)	(0.47)
Wadala	2147	0.00	38.67	0.76	0.43	9348.12	1.25	2.47	0.26
		(0.00)	(8.38)	(0.43)	(0.49)	(740.13)	(1.16)	(1.31)	(0.44)
All	17896	0.61	37.65	0.86	0.40	8470.3	1.25	2.37	0.372
		(0.49)	(8.45)	(0.34)	(0.49)	(1487.8)	(1.17)	(1.29)	(0.48)

On an average 61 percent of customers have had to undergo the financial literacy program. The average age of customers is 37 years, 86 percent of the customers are married and have 2.4 dependents on average in their homes. The monthly income is approximately INR 8500, translating to an annual income of INR 100,000. More than a third (40 percent) of the customers are from the Schedule Caste (or other backward caste). We refer to this group as Reserved Caste in this paper, owing to reservations in government institutions for these castes as part of the affirmative action program in India.

The customers of Swadhaar include first time customers as well as repeat customers. This is indicated by a variable called loan series. A value of 1 indicates that this is the first loan cycle of the customer with Swadhaar. A value of 2 indicates that the customer is in her second loan cycle. The value of loan disbursed depends on the loan cycle of the customer. As the customer progresses into loan cycles, the amount of loan disbursed is higher. Table 3 shows the number of customers at various loan cycles with Swadhaar. Most customers in our data-set are in the first or second loan cycle, and have loans of INR 15,000 to INR 19,000 on average.

Table 3 Average amount disbursed in each loan cycle

Loan series	N	Average amount disbursed (INR)
1	9512	14,666.42
2	5787	17,182.13
3	1871	18,003.21
4	633	19,131.12
5	83	19,433.73
6	10	19,000.00

3.3.1 Outcome of interest: Loan repayment

In order to evaluate loan repayment performance, we need to observe the repayment schedule of individuals across the tenure of the loan. Since the financial education program was administered over 2012, most loans after the education program have had a complete tenure of six months before February 2014. We therefore focus on the first six installments only. We use three measures of loan repayment performance:

1. Days late in each of six installments
2. The total number of days late over six installments
3. The total number of months of delayed repayment

Table 4 shows the average and standard deviations of the outcome variables. On an average, customers of Swadhaar repay their loans before the due day. However, customers of branches which have not undergone financial literacy training repay their loans a little after the due date. In the case of each installment, customers in branches without financial literacy training take slightly longer, on an average, than customers in branches with financial literacy training. We also find that the standard deviation of the number of days late as the installment progresses is larger among individuals without financial literacy training.

Table 4 Summary statistics: Loan repayment

		Training	
	Full sample	Yes	No
N	17896	10901	6995
Days late installment #1	-0.06	-0.21	0.17
	(3.07)	(2.13)	(4.13)
Days late installment #2	-0.04	-0.09	0.03
	(3.36)	(2.98)	(3.88)
Days late installment #3	-0.08	-0.10	-0.05
	(5.09)	(4.92)	(5.34)
Days late installment #4	-0.03	-0.02	-0.03
	(6.27)	(5.89)	(6.82)
Days late installment #5	-0.28	-0.32	-0.21
	(6.43)	(5.33)	(7.85)
Days late installment #6	-0.29	-0.37	-0.18
	(8.23)	(7.51)	(9.24)
Total Days Late	-0.78	-1.10	-0.27
	(19.69)	(16.69)	(23.61)
Number of months late	0.11	0.06	0.18
	(0.40)	(0.26)	(0.54)

4 Methodology

The causal relationship between financial training and financial outcomes is difficult to measure. This is because there is always the possibility that other unobserved factors, such as numerical ability or forward-looking behavior, contribute to the decision to undertake financial literacy training introducing unobserved selection bias into the sample, and biasing the results on financial outcomes. We therefore require a source of exogenous variation in who receives financial education.

We utilize the timing of the financial literacy program across the various branches to identify if there was an improvement in the loan repayment performance. Specifically we use the following difference-in-difference (DID) approach:

$$y_{it} = \alpha_0 + \alpha_1 Fin_{it} + \alpha_2 X_{it} + \alpha_3 B_i + \alpha_4 S_i + \alpha_6 M + \epsilon_{it} \tag{1}$$

Here, y_{it} is our measure of repayment performance of individual i of a loan taken at time t. Fin_{it} is equal to 1 if the individual received the mandatory financial education at her branch at time t. X_{it} is a set of controls for individual characteristics at the time t. In particular, we control for the disbursed amount of the loan, loan series, marital status, age and age squared, a dummy variable for whether the individual was literate or not, monthly income, number of earning members in the household, a dummy variable for belonging to a reserved caste (i.e. Scheduled Caste (SC), Scheduled Tribe (ST) and Other Backward Class (OBC)), and the number of dependents in the household. B_i and S_i are branch and state (Maharashtra and Gujarat) fixed effects respectively. M is a set of fixed effects that control for the month in which the loan was disbursed and ϵ_{it} stands for all unobservable factors that affect an individual's loan performance. All regressions also include a dummy for the tenure of the loan (12 months or 24 months) and year (i.e. 2012 or 2013).

After controlling for variations in location (B) and timing of disbursement (M), α_1 captures the *difference-in-difference* estimator, identified through the variation in average loan performance between branches with and without financial literacy, before and after the literacy program was initiated.

The underlying assumption behind the identification strategy is that conditional on observed individual characteristics, the change in average loan repayment performance over time would have been the same at all branches in the absence of the education program. Therefore, any difference between the loan performance in branches with and without financial literacy is attributed solely to the literacy program.

5 Results

In this section, we present results from a regression analysis of equation (1). We evaluate loan repayment performance over six installments. The results for loan repayment in each of the six installments is presented in Table 5. The regressions include the entire set of control variables including branch and state fixed effects. Financial literacy led to a decrease in number of days a repayment was delayed in each of the six installments. Moreover, the magnitude of the effect increases with each installment and the results are highly statistically significant for later installments. Relative to those with no financial education, financially literate individual are repaying the first installment 0.25 days earlier and the sixth installment one day earlier.

Table 5 Results: Difference-in-difference

	(1) First Installment	(2) Second Installment	(3) Third Installment	(4) Fourth Installment	(5) Fifth Installment	(6) Sixth Installment
Financial Literacy	-0.256*	-0.303*	-0.475**	-0.617**	-0.792***	-1.101***
	(0.143)	(0.163)	(0.235)	(0.301)	(0.302)	(0.371)
Disbursed Amount	-0.000	-0.000	-0.000**	-0.000***	-0.000	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Loan Series	-0.164***	-0.098**	0.061	0.220**	0.114	0.169
	(0.042)	(0.048)	(0.069)	(0.089)	(0.089)	(0.109)
Married	-0.058	0.045	0.211*	0.101	0.067	0.291*
	(0.068)	(0.078)	(0.112)	(0.143)	(0.144)	(0.177)
Age of Client	0.040*	-0.035	0.005	0.071	0.017	0.099*
	(0.022)	(0.025)	(0.037)	(0.047)	(0.047)	(0.058)
Age Squared	-0.001*	0.000	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
No Education	0.046	0.020	0.054	0.213**	0.052	0.098
	(0.049)	(0.056)	(0.081)	(0.103)	(0.104)	(0.128)
Monthly Income	0.000**	0.000***	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of Earning Members	-0.051	-0.077	-0.036	0.003	-0.066	-0.135
	(0.043)	(0.049)	(0.070)	(0.090)	(0.090)	(0.111)
Reserved Caste	0.112*	-0.134**	0.087	0.154	0.046	0.062
	(0.050)	(0.057)	(0.082)	(0.105)	(0.106)	(0.130)
Number of Dependents	-0.010	-0.016	-0.061**	-0.045	0.032	0.018
	(0.018)	(0.020)	(0.029)	(0.037)	(0.038)	(0.046)
Branch Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16272	16272	16272	16272	16272	16272
R-Squared	0.03	0.03	0.02	0.04	0.02	0.01

* Significant at the 10%; ** at the 5%; *** at 1% levels
Regressions control for the duration of the loan i.e. 12 months or 24 months
All regressions control for year, month and state fixed effects

In Table 6, Columns (1) and (3), where we do not include branch fixed effects, presents estimates for the effect of financial literacy on total days late and number of months late respectively out of six installments. Columns (2) and (4) present corresponding estimates for models with branch fixed effects.

While financial literacy decreases the total days an individual is late in repayment, it increases the number of months that individual makes a repayment late out of 6 install-

Table 6 Results: Difference-in-difference

	(1) Total Days Late	(2) Total Days Late	(3) Number of Months Late	(4) Number of Months Late
Financial Literacy	-1.999***	-3.544***	-0.141***	0.052***
	(0.340)	(0.910)	(0.007)	(0.020)
Disbursed Amount	-0.000*	-0.000***	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Loan Series	0.187	0.301	-0.001	0.001
	(0.268)	(0.268)	(0.006)	(0.006)
Married	0.457	0.657	-0.019**	-0.008
	(0.433)	(0.433)	(0.009)	(0.009)
Age of Client	0.208	0.197	0.007**	0.006**
	(0.142)	(0.142)	(0.003)	(0.003)
Age Squared	-0.003	-0.003	-0.000**	-0.000*
	(0.002)	(0.002)	(0.000)	(0.000)
No Education	0.498	0.482	-0.013**	-0.010
	(0.313)	(0.313)	(0.007)	(0.007)
Monthly Income	0.001***	0.000	0.000***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Number of Earning Members	-0.439	-0.362	-0.015**	-0.014**
	(0.273)	(0.272)	(0.006)	(0.006)
Reserved Caste	0.884***	0.327	0.034***	0.005
	(0.299)	(0.319)	(0.006)	(0.007)
Number of Dependents	-0.051	-0.082	0.002	0.002
	(0.113)	(0.113)	(0.002)	(0.002)
Branch Dummies	No	Yes	No	Yes
Observations	16272	16272	16272	16272
R-Squared	0.02	0.03	0.03	0.05

* Significant at the 10%; ** at the 5%; *** at 1% levels
Regressions control for the duration of the loan i.e. 12 months or 24 months
All regressions control for year, month and state fixed effects

ments. Specifically, total number of days repayment is delayed decreases by approximately 2 days in Column (1) and the magnitude of the coefficient almost doubles in the specification with branch fixed effects (i.e. a coefficient of 3.5). On the other hand, the effect of financial education on number of months delayed is negative in Column (3) but the sign on the coefficient becomes positive in Column (4) with branch fixed effects. Individuals take about 0.05 months more to repay their loans after taking the financial education class.

There are at least two explanations for the positive effect on the months variable. Swadhaar uses the daily balance method to calculate interest rate on delayed payments i.e. the application of a daily interest rate to the full amount of principal in the account each day. If the individual delays repayment, it is cheaper to spread the interest burden over more months than to pay a high interest every month. Past research suggests that microfinance clients in India think about their loans in terms of how much they owe on a weekly basis but know little about their interest rate (Tiwari, Khandelwal, and Ramji, 2008). Thus, our results may suggest that not only does financial literacy lead to a decline in the average number of days it takes to repay debt but also improves financial well being of the customers as individuals start thinking about their financial decisions

in terms of interest rates and the time value of money. A second explanation could be that the positive coeffcient is in fact being driven by a particular branch. We explore this further in the robustness checks in section 6.1 where we show results dropping one branch at a time.

Disbursed amount has a negative effect on days late though the coefficient is close to zero. This is consistent with MFI's trying to allocate larger loans to borrowers with lower probability of default and reduce the lateness in repayment. As one would expect, number of earning family members is negatively related with time taken to repay debt.

Table 7 Results: Heterogeneous Effect of Caste

	(1) Total Days Late	(2) Total Days Late	(3) Number of Months Late	(4) Number of Months Late
Financial Literacy	-2.840***	-4.283***	-0.159***	0.050**
	(0.412)	(0.951)	(0.009)	(0.020)
Reserved Caste*Financial Literacy	2.173***	1.693***	0.045***	0.004
	(0.606)	(0.632)	(0.013)	(0.014)
Reserved Caste	-0.396	-0.580	0.007	0.002
	(0.466)	(0.465)	(0.010)	(0.010)
Branch Dummies	No	Yes	No	Yes
Observations	16272	16272	16272	16272

* Significant at the 10%; ** at the 5%; *** at 1% levels
Regressions control for the duration of the loan i.e. 12 months or 24 months and demographic variables
All regressions control for year, month and state fixed effects

We are interested in the effect of financial literacy on different subgroups of borrowers. To study this heterogeneous effect, we interact financial literacy with whether the individual belongs to a reserved caste, is married and is not educated. Here, we present results for the regression of interactions of financial literacy variable with belonging to a reserved caste. For the other two variables, the main results do not change and the interaction term is statistically insignificant.[9] The results for the heterogeneous effect of caste is shown in Table 7.

While the sign of the effect of financial literacy on the various outcome variables is unchanged, the coefficients are larger in magnitude. Moreover, the interaction term is positive and significant for total days late. The independent effect of caste on the outcome variables is no longer significant. The interpretation of this result is perplexing as it suggests that individual members of the reserved caste who took the financial literacy class have worse financial outcomes, as measured by the delay in repayment days, compared to reserved caste borrowers who did not take the class. One explanation for this result could be that before taking financial education classes, MFI members from disadvantaged groups use informal loans to repay MFI debt on time. Jain and Mansuri (2003) argue

[9]The tables for heterogeneous effect by marital status and education are available upon request.

that MFI borrowers know that repayment must begin almost immediately after loan disbursement, and typically much before project returns are realized. Thus, they must be able to access funds to finance the installment and end up borrowing from informal sources. Moreover, Bonte and Filipiak (2012) note the existence of informal financial investment options, e.g. lending to other family members among backward classes in India. The positive coefficients on the interaction term could be due to a decrease in informal sources of borrowing to repay MFI debt after taking financial education classes. Financial literacy can make individuals more circumspect about the costs of borrowing from multiple sources to repay debt, however, we do not have the required data to directly test this hypothesis.

Next, we study the effect of social ties and group homogeneity on repayment. Our data allows us not only to test the effect of group homogeneity on repayments but also the interaction effect of financial literacy and social ties. To explore this relation further, we make use of the caste data in our sample and define a group as being homogeneous when all group members belong to the same caste.

In Table 8, "All Reserved" is a dummy variable that takes the value of 1 if all members of a particular group lending program belong to the reserved classes i.e. SC, ST or OBC. Similarly, "All General" Caste takes the value of 1 if all members in a group are from the general category. Thus, these two dummy variables reflect homogeneous groups where each member belongs to the same caste. The omitted category is the mixed groups which includes members from both reserved and general caste.

Table 8 Results: Group Homogeneity

	(1) Total Days Late	(2) Number of Months Late
Financial Literacy	-3.117***	0.070***
	(1.002)	(0.022)
All Reserved*Financial Literacy	0.994	-0.033*
	(0.808)	(0.017)
All Reserved Caste	-0.887	0.029**
	(0.627)	(0.014)
All General*Financial Literacy	-1.409**	-0.022
	(0.695)	(0.015)
All General Caste	-0.591	-0.002
	(0.510)	(0.011)
Observations	16264	16264

* Significant at the 10%; ** at the 5%; *** at 1% levels
Regressions control for the duration of the loan i.e. 12 months or 24 months and demographic variables
All regressions control for year, month, branch and state fixed effects

The estimates are from a regression of repayment time on financial education, a dummy for All Reserved Caste, a dummy for All General Caste and their respective interactions

with the financial literacy variable. All other control variables are the same as in our complete baseline specification with branch fixed effects. The difference in sample size from earlier tables is due to the exclusion of some observations for whom we observe only one group member.

The effect of financial literacy on total days late and number of months late is unchanged though we observe larger coefficients. Groups where all members are from reserved caste delay repayment by about 0.03 months compared to a heterogeneous group with mixed caste members. However, homogeneous reserved groups who take financial literacy have a equivalent decrease (i.e. 0.03 months) in number of months delayed relative to heterogeneous group members who also took financial literacy. Thus, if all group members belong to the same backward caste, there is a detrimental effect on repayment time compared to belonging to a heterogeneous caste group. However, that effect goes away after taking financial education classes. At the same time, being in a All General Caste group has no detrimental effect on repayment time relative to being in a mixed group. But the coefficients on days delayed for the interaction of financial literacy with this group is negative and significant (approximately 1.5 days). This suggests that financial literacy is complementary to group homogeneity for both reserved and general caste members.

6 Threats to validity

6.1 Dropping one branch at a time

Since we are exploiting variation in timing of implementation of the financial education classes across branches, we need to worry about the results being driven by particular branches. In Table 9, we show results from our baseline regressions after dropping one branch at a time where the first row gives the main results shown earlier in Table 6. The result for total days late is robust to dropping each of the branches though when we drop Thane, the result loses statistical significance. A reason for this could be that in branches where training took place, we do not have much variation in the proportion of individuals who took financial education. As one can see from Table 2, Thane is in fact the only branch where a relatively large proportion of individuals took training (12 percent) compared to 4 percent in Anand and 6 percent in Gotri. Thus, dropping Thane leads to insignificant but still negative results, which is reassuring.

However, number of months is not robust to dropping Wadala. In fact the coefficient changes sign upon dropping Wadala suggesting that the effect of financial literacy on

Table 9 Results: Dropping one branch at a time

	Total days late	No. month late	N
Main result	-3.544***	0.052***	16272
	(0.910)	(0.020)	
Anand Dropped	-3.520***	0.079***	12214
	(1.131)	(0.028)	
Bharuch Dropped	-3.047***	0.139***	12432
	(1.004)	(0.021)	
Gotri Dropped	-4.735***	0.038*	12425
	(1.119)	(0.023)	
Thane Dropped	-1.485	0.102***	13581
	(1.160)	(0.028)	
Wadala Dropped	-3.713***	-0.036**	14436
	(0.870)	(0.018)	

* Significant at the 10%; ** at the 5%; *** at 1% levels
Regressions control for the duration of the loan i.e. 12 months or 24 months and demographic variables
All regressions control for year, month, branch and state fixed effects

number of months late is negative for most branches. We explore this further in the next subsection on matching estimation.

6.2 Matching estimator

One concern with a difference-in-difference specification is the lack of match balance in the sample. If the characteristics of individuals are not comparable across the various branches, then it may be possible that the DID estimates will be biased. We therefore also analyze the impact of financial literacy by obtaining a control sample that is similar to the treated observations.

Let P_{it} be an indicator if person i underwent the financial literacy program at time t. Let y^1_{it+s} be the loan repayment status of person i at time $t+s, s>0$. Let y^0_{it+s} be the loan repayment status had person i not undergone the training. The causal effect of financial literacy for person i at time $t+s$ is:

$$y^1_{it+s} - y^0_{it+s}$$

The problem however is that y^0_{it+s} is unobservable.

We want to estimate the loan repayment the treated individuals would have experienced, on average, had they not gone through the financial education program. We use the matching methodology to construct such a counterfactual (Rosenbaum and Rubin, 1985; Heckman et. al., 1997; Dehejia, 2005). We pair individuals who have gone through the training program with those who have not such that the loan repayment is comparable before and after the training program.

We first choose a set of observable characteristics based on which the matching should be done. These include:

- *Demographic variables*: Age, Marital Status and Literacy
- *Family composition*: No. of dependents and No. of earning members in the family
- *Loan characteristics*: Tenure of the loan (12 months or 24 months), amount of the loan, and the loan cycle
- *Monthly income*
- *Month and year of loan*: This includes the month on which the loan was taken as well as the year.
- *City*: This includes the city in which the individual is based.

We match on the continuous variables such as age, age square, income, number of dependents, number of earning members, amount of the loan for each category of combination of the indicator variables. This implies that a married, illiterate person from the reserved category in loan cycle 1 is matched with a person within this same category on variables such as age, dependents, earning members, disbursed amount and income.

Second, we establish a distance measure and choose the optimal matched individual for each treated individual. As the policy to initiate the financial education program was exogenous, we use the Mahalonobis distance measure for nearest neighbour matching, which is calculated as follows:

$$D_{ij} = \left[(X_i - X_j)'^{-1}(X_i - X_j)\right]^{\frac{1}{2}}$$

where D_{ij} is the distance between the treated unit i and control unit j and X_i and X_j are the characteristics of the treatment and control units.

A standard matching estimator of the causal effect of the financial education program can be written as

$$\mu = \sum_{i \in T}(S_i - \sum_{j \in C} g(p_i, p_j) y_i)$$

Here $g(.)$ is a function assigning the weights to be placed on the comparison household j while constructing the counterfactual for the treated household i. The weights used in our estimation are the inverse of the variances. We employ a one-one matching estimator with replacement. We set a caliper of 0.1, which implies that all matches not equal to or within 0.1 standard deviations of each covariate are dropped. This leaves us with a total of 2455 treated and control observations, making the total sample size equal to 4910.

Table 10 Balancing tests

This table reports the balance statistics for the various variables after the matching exercise.
Std. diff is the standardized difference defined as the difference in means between the treatment households (group T) and the appropriately matched comparison households (group C) scaled by the average variances of the income variable in the two groups.
t-test p val is the p value from a paired t-test between the treated and control households.
Var ratio is the variance ratio of treatment over control groups.
KS statistic reports the statistic from a test of a significant difference across the entire distribution.

	(1) Mean Treated	(2) Mean Control	(3) Std diff	(4) Var ratio	(5) t-test p-val	(6) KS bootstrap p-val
Disbursed amount	16357	16357	0	1	1	1
Age	36.40	36.40	0	1	1	1
Age square	1372.3	1372.3	0	1	1	1
Monthly income	8953.9	8960.2	-0.64	1.01	0.00**	0.00**
No. of earning members	2.02	2.02	0	1	1	1
No. of dependents	2.33	2.33	0	1	1	1

6.2.1 Testing the reliability of the matching model

The matching procedure will result in a reliable method for estimating the impact of the financial education program if, the pre-reform variables are balanced between the treatment and control groups. It is therefore important to verify if the balancing condition is satisfied by the data.

In Table 10 we report several balance measures for income and wealth variables and not for the discrete variables, as the former are matched within each group of the combination of discrete variables. The first two, in columns (1) and (2) are the means of the treated and control group respectively after matching.

The third, reported in column(3), is the standardized difference as described by Smith and Todd (2005). For example, the standardized bias for the income variable is defined as the difference in means between the treatment households (group T) and the appropriately matched comparison households (group C) scaled by the average variances of the income variable in the two groups. The lower the standardized difference, the more balanced or similar the treatment and comparison groups will be in terms of the variable under consideration. We are way below the threshold of 20 for all our variables.

In column (4) we report the variance ratio of treatment over control, which should be equal to 1 if there is perfect balance. We find that the Var ratio is close to 1 for most of the variables as well.

Further, for each variable entering the propensity score mode, we perform a formal paired

Table 11 Results: Loan repayment performance

	Total days Late (1)	Number of Months Late (2)
Estimate	-1.14**	-0.14***
Std. error	(0.49)	(0.01)
No. of treated obs	9806	9806
No. of matched treated obs	2455	2455

Significance code: ***1%, **5%, *10% levels

t-test between the treated and control households to confirm that no significant difference exists. The result is reported in column (5). The p-value of the bootstrapped Kolmogorov-Smirnov (KS) test statistic which tests for a significant difference across the entire distribution is reported in column (6).

We find that only the monthly income variable reports a t-statistic and a KS-statistic p-value that is statistically significant. The variable reports a reasonable standardized difference, and a variance ratio.[10]

From the tests reported in this section we find that no variable consistently performs poorly on all tests. We are satisfied with the balance properties from the matching exercise, and proceed to discuss the results.

6.2.2 Results: Matching methods

The results from the matching estimation are presented in Table 11.

Column (1) reflects the average treatment effect on the total number of days late over the first six installments. Column (2) reflects the effect on the number of months late over the first six installments. Mandatory financial literacy is seen to have lowered the total number of days late in six months by 1.14. The number of months late is also lower after the financial education program. The results are significant at the 5 percent and 1 percent levels respectively. The result on the number of days late is consistent with the difference-in-difference regressions discussed in Table 6.

Our result on the number of months late is not consistent with the difference-in-difference result. We find that the number of months that repayment is delayed also dropped

[10]We calculate match balance for a caliper of 0.05. We find that the KS-statistic p-value is not statistically different between the treated and control groups. The sample size drops to 1518 treated observations and a total sample size of 3036. The results, however, do not change. These are available upon request.

after the financial literacy training program. This is consistent with the result from the robustness check described earlier, which also showed a decline in the number of months after the receipt of financial training.

7 Conclusion

The urban poor are a sizeable chunk of India's population. According to the United Nations, by 2026, an estimated 535 million people (40 percent of India's population) will live in towns and cities, mainly because of migration in search of better employment opportunities. These people are not financially literate, find it difficult to access formal finance, and are often reliant on semi-formal sources such as micro-finance institutions. This group is a potential beneficiary of the global push towards better financial consumer protection through improved financial literacy.

In this paper we evaluate the impact of a mandatory financial education program on customers of an urban micro-finance institution (MFI) headquartered in Mumbai, and having branches in both Mumbai and Gujarat. We exploit the variation in timing of the financial literacy program across the branches to identify if there was an improvement in the loan repayment performance.

Our results suggest that financial literacy led to a decline in the total number of days taken to make loan repayments as well as the number of months in which repayment is delayed. More importantly, financial education seems to have helped those in homogeneous groups of reserved castes overcome their initial disadvantage of low financial literacy relative to those in mixed caste groups. These are important contributions in light of the emphasis on financial inclusion and pervasiveness of low financial literacy in developing countries. Moreover, this segment of the population has low levels of general literacy translating to limited financial awareness and thus, often causing adverse financial outcomes. Thus, financial literacy may help these disadvantaged groups overcome the perpetual cycle of indebtedness and poor financial choices which makes it harder for them to break discriminatory social barriers.

It is possible that our results are driven less by the content of the mandatory program itself, and more by the program raising general awareness and encouraging individuals to seek more information from other education programs. A similar result was found by Carpena et. al. (2011) who suggest that while financial education does not improve financial decisions that require numeracy, it does improve financial product awareness and individual attitudes towards making financial decisions. Even if the channel of the

effect was indirect, the results imply that constituting some kind of literacy training can have an impact on repayment behavior of customers. To the extent that customers would not have sought the extra education without going through the mandatory program, the program should be seen to deliver better financial outcomes. This is an important finding in light of the lack of consensus on the role of financial literacy in improving outcomes.

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